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Medical
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THE
LARYNGOSCOPE.

VOL. LV JANUARY, 1945. No. 1

A REVIEW OF TUBERCULOSIS.

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Boulder, Colo.

A few British journals and some from South America for 1944 have been received in this country. Those received to date have no articles on tuberculosis. Journals from all of the other countries are not available for review. One from Canada for 1944 and one from Russia for 1942, not previously reviewed, are presented in addition to three from the American journals.

Radner and Pinkerton[1] have reviewed quite thoroughly the rather limited literature of tuberculosis of the nasal accessory sinuses. Prior to six years ago there were almost no articles on this subject. They report one case in Honolulu, a Japanese male, age 20. The patient was admitted to the hospital on account of hemoptysis (four ounces) one month before, followed by a second hemoptysis (four ounces) three weeks before admission. At the time of the hemorrhages the patient had fever, malaise and loss of five pounds in weight. On admission the sputum was blood-tinged; temperature, 99.2° F.; weight, 115 pounds. Physical examination was negative except for a few coarse, moist rales heard over the right apex and base. The tonsils were moderately large. The ears and larynx were negative. The middle turbinates were hyperplastic. Roentgen-ray films of the chest showed a minimal infiltration of the right apex and first interspace. The blood count was normal.

The hyperplastic middle turbinates increased in size dur-

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ing the six months after the first examination, so that the mass on the left had to be removed under local anesthesia. The nasal mucosa returned to normal following the operation. With bed rest the right lung improved, but the sputum continued to show acid-fast bacilli.

Over two years after the first admission, the patient complained of headache and pain in the left side of the face. The return washing from the left maxillary sinus was clear. Roentgen-ray films showed only moderate thickening of the antral mucosa; all other sinuses were normal.

Seven years after the first examination the return washings from the maxillary sinuses showed acid-fact bacilli. A bilateral nasoantral resection was done, and hyperplastic tissue was sent to the laboratory for study. The animal inoculations were positive for each sinus. The patient made a good recovery following sinus surgery and the lungs improved.

The article by Radner and Pinkerton is very complete. They examined their patient many times over a period of seven or eight years. The article emphasizes the importance of tuberculosis of the sinuses.

Szanto and Hollender[2] studied 134 autopsy specimens of the pharynx. There were 24 subjects with various forms of tuberculosis in the series of 134 autopsies. The nasopharynx was involved in 18 specimens. Gross lesions were visible in 14, and four detected only by microscopic examination. As an introduction the authors reviewed the literature of this disease, consisting of eight articles.

The gross lesions were irregular, oval ulcers with undermined margins and yellowish-gray bases. Microscopic examination of those without gross lesions showed in four subepithelial tubercles with epithelioid cells, giant cells and incipient or advanced caseation necrosis. The authors presented one very long table and one short table with one microphotograph and one photograph of a gross specimen. There are five important points in the summary. The article is a very good one and represents important and painstaking work; however, the statements under No. 1 of the summary and conclusions, that "As a complication of pulmonary tuberculosis its (nasopharyngeal tuberculosis) incidence is greater than

that of tuberculosis of the larynx" is hardly justified by the experience of many well trained otolaryngologists in this and other countries. The otolaryngologists who study their patients thoroughly will examine the nasopharynx and pharynx as carefully as they examine the larynx. Statistics vary greatly even when many large series are compared. Tuberculosis of the pharynx, whether naso, oral or hypo, is a rather common late complication of pulmonary tuberculosis but not more frequent than laryngeal.

Cote's[3] paper is a general one presented before the French-Canadian Society of Otorhinolaryngologists at Sherbrooke, Oct. 9, 1943. It contains no case reports.

The author's chief point is that tuberculosis of the ear is often unrecognized unless the presence of far advanced pulmonary lesions suggests its diagnosis. It is much more frequent than is generally supposed, and he believes that examination of the pus from chronic otorrheas would show 10 to 20 per cent of them to be tuberculous.

He discusses the various routes of infection, the associated infections and the clinical forms. The lymphatic route is probably the most frequent, and to this class belongs the otitis of childhood, with its sudden onset, fever, severe pain and perforation of the eardrum. It is likely to be a mixed infection and it is only after the acute symptoms caused by the pyogenic microbes have subsided that its true nature can be determined. The recognition of this form is of the utmost importance: it is the most frequent and the most easily cured, but also, unfortunately, the most difficult to recognize. It should always be kept in mind in connection with otitis in children, whatever may be the symptoms and course, since, if proper ly treated, it can be cured. The child should be treated first as a tuberculous patient; that is, by rest, heliotherapy and residence in the country.

The article is a good one, but it has very little to offer which is new.

Zobin[4] presented his own operative method: The supraligamentous portion of the larynx receives its blood supply through the superior laryngeal artery; the author alcoholizes this artery and its surrounding tissue for the purpose of

destroying a large number of sympathetic fibres and simultaneously resects the superior laryngeal nerve. The technique consists in having the patient in position with head thrown back and to the side. A horizontal incision is made between the sublingual bone and the upper margin of the thyroid cartilage. The above incision exposes the omohyoid and sternohyoid muscles above the thyroid cartilage; the muscles are drawn toward the median line, thus freeing the quadrangular space filled with connective tissue. The superior laryngeal artery is freed of the adjacent tissue and thoroughly dabbed with 85° alcohol. A length of about 1 to 1.5 cmm. is excised. A catgut suture is applied to the fascicule and silk to the skin. The above operation was applied to 25 patients with ulcerative laryngeal tuberculosis; bilateraly to seven patients. The author had 20 cases of total infiltrative-ulcerative processes of the larynx and five cases of unilateral. The state of the patients was grave. Peripheral innervation of the larynx was applied for study of the reaction of tuberculous tissue to sympathetic denervation; the results were positive. In seven cases only 85° alcohol was applied to the vasculoneutral bundle lying on the sublingual thyroid membrane. In 18 cases there were resections of the supralaryngeal nerve and applications of alcohol to the innominate artery. Local treatment of the laryngeal process consisted of a daily application of menthol oil. The method showed that disympathization aids the process of regeneration, but the stability of attained improvement depends solely on the immunobiological state of the organism.

The author has substituted a major surgical operation for the relief of pain when a much simpler minor surgical procedure will do as well and probably better. Most of these patients are suffering from such advanced laryngopulmonary tuberculosis that they cannot stand surgery. The least inconvenience for the patient with the maximum relief of pain is the procedure of choice, such as injection of the superior laryngeal nerve with alcohol.

Rothstein and Pirkle[5] believe laryngeal tuberculosis is almost as frequent as pulmonary tuberculosis, especially in patients with positive sputum and cavities. They quote Lederer's figures of 50 to 80 per cent incidence of laryngeal tuber-

culosis. The importance of cicatricial tissue in producing stenosis is emphasized.

The authors reported one case from the Indiana State Sanitarium at Rockville, Ind. A white female, age 30, was admitted with far advanced bilateral pulmonary tuberculosis without cavities. The sputum was positive and the larynx extensively involved. Following artificial pneumothorax the sputum was negative part of the time. After 27 months in the hospital there was fusion of the anterior ends of the vocal cords with aphonia, stridor and dyspnea. The laryngeal aperture would not admit a 5 mm. bronchoscope. The dyspnea increased, so that a tracheotomy was performed. The pulmonary tuberculosis was arrested by collapse therapy, and the patient was able to walk two hours daily after three and a half years at the sanitarium, but she continued to wear the tracheotomy tube. The larynx showed very little change. The authors have reviewed the recent literature of tracheotomy for laryngeal tuberculosis and they discussed plastic laryngeal surgery, as suggested by Dr. Gordon B. New, to restore the laryngeal airway and eliminate the necessity for the tracheotomy tube.

The article is complete and the use of plastic surgery for laryngeal stenosis is certainly a step in the right direction. This is not so new for laryngeal stenosis caused by other diseases, but it is hoped that in the future it will be used more frequently for the healed tuberculous larynx. There is danger of the disease becoming active, following any surgical trauma, even if the laryngeal disease has been inactive for months or even several years. Tuberculosis in any organ is likely to be activated more readily by surgery than syphilitic lesions for instance.

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FUNCTIONAL STUDIES ON LABYRINTHINE FENESTRATION IN ANIMALS — I.*

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Rochester, N. Y.

The fenestration operation, designed to improve hearing in the otosclerotic patient, has become a widely accepted therapeutic procedure. Although details of the technique are still subject to modification and further development, the underlying principle seems to have met with rather general approval. For evaluation of the operative success the patient has to be the supreme forum. Both his personal satisfaction, based on practical hearing gain, and his audiogram as measured by the common hearing tests, are the chief criteria by which the otologist judges the value of the operation. Since both sources are based on the patient's statements, certain discrepancies between the results obtained by different authors, or obtained by the same author at different times, are inevitable.

It seemed, accordingly, desirable to endeavor to duplicate the fenestration procedure in animals and to test the results by functional methods. This has been done in the Rochester laboratory for the last few years. In performing these experiments, hearing tests, based either on electrical or behavioral observations, are employed. Both methods, widely used in physiological and psychological work, seem to furnish results that are somewhat more consistent than hearing tests on human subjects. Another advantage of the animal experiment is the complete freedom in operative technique. It is, however, only fair to mention here some disadvantages inherent in studies of this type. In the first place, it is at present impossible to produce otosclerosis in animals; functionally

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*Communication No. 63 from the Laboratory of Audition, with the collaboration of Elmer A. Culler. This laboratory is maintained by aid of the Research Council, American Otological Society. This paper constitutes part of a report, read before the Seventy-seventh Annual Meeting of the American Otological Society, Inc., June, 1944.

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similar changes, therefore, had to be substituted. Second, operative procedure, after-treatment (in chronic experiments), technique of testing, etc., make the work tedious and introduce sources of potential error. However, in view of the wide difference between clinical and experimental procedures, concordant observations would possess a high degree of evidential value.

In this first report, experiments will be described in which the animal's hearing was tested by the electric method. This method is based on the Wever and Bray effect. The inner ear of an animal generates a reproducible potential if exposed to sound of a certain frequency and intensity. According to our present knowledge, it seems somewhat uncertain how close a correlation exists between hearing sensation and cochlear potential. For the purpose of this investigation, however, it is only necessary to assume that the cochlear potential is a measure of vibration in the living cochlea. Inasmuch as all the changes studied here pertain to the sound-conduction mechanism, nervous action need not be considered.

The general plan of these experiments consists of three steps: determination of cochlear potential in the suitably prepared animal, operation and, finally, repetition of electrical tests. A reliable comparison of pre- and postoperative potentials is possible so long as no structural changes have taken place between the two sets of tests. This method, therefore, permits only the study of the immediate effects of fenestration. For all other purposes, behavioral tests are necessary, which will be described in a subsequent paper.

As test animals in this group, pigeons were chosen since their semicircular canals are easily accessible and consistent cochlear potentials can be recorded.[1] With birds as experimental animals, a type of deafness resembling otosclerosis can easily be obtained. Since there is only one ossicle, plugging of the outer meatus also immobilizes the columella (stapes) footplate.

TECHNIQUE.

The animals were anesthetized by intraperitoneal injection of nembutal (0.1 to 0.15 cc. usually suffice) and placed in a special head holder permitting complete immobilization of

the head. The bill was kept open at a constant angle. This detail is of importance since the degree of opening is of influence on the animal's cochlear response.[2] The outer meatus was filled with bone wax. The horizontal canal was exposed and completely freed from surrounding bone, this being requisite for obtaining constant potentials. For reasons to be discussed later, care must be taken not to injure the venous sinus accompanying the canal. The surface of the superior bony canal is also exposed.

Sound is offered through a calibrated loud speaker, intensity being controlled by means of an attenuator. Since the region of the round window is not always accessible, the active electrode (made of tungsten wire) was placed on the most prominent part of the horizontal canal. The indifferent electrode was connected with the edge of the skin incision. Cochlear potentials thus obtained are very consistent, providing the bony horizontal canal is kept dry by freeing it from surrounding bone. Other places were not equally suitable for placement of the active electrode since the potentials vary greatly with change in moisture of the preparation. The potential is amplified, filtered, again amplified, and determined by means of a voltmeter. In some of the later experiments, a No. 736-A General Radio wave analyzer was used for determination of the potentials. Three to four such determinations were made for each frequency and intensity. I order to avoid disturbance of the physical conditions at the site of pickup, the fistulization was performed on the superior semicircular canal (see Fig. 1). This was done by means of a dental burr under a binocular dissecting microscope. In the pigeon, it seems impossible to penetrate the bony canal without opening the endosteal layer. Perilymph always issues before the bone dust is completely removed. It is, however, rather easy to avoid injury to the membranous canal since its wall is comparatively thick (see Fig. 2). The moisture due to escape of perilymph never spreads to the horizontal canal, and consistent postoperative measurements can generally* be taken after fenestration.

This experiment was performed on 12 pigeons. Since preoperative potentials varied from animal to animal, probably due in part to variations in the thickness of the bony wall

*For one exception, see below.

of the horizontal canal, averages cannot be given; but the fenestration was invariably followed by a distinct increase in cochlear response, providing gross injury of the mem-

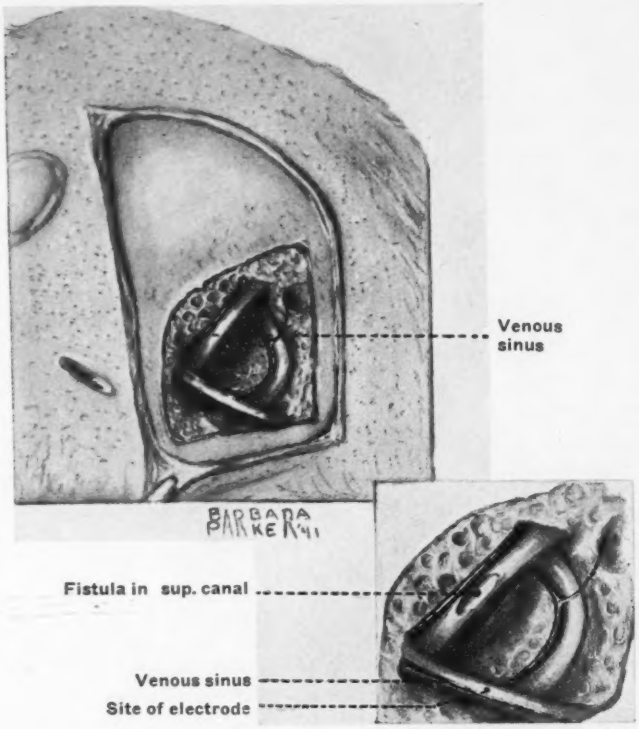


Fig. 1.

branous labyrinth and the venous sinuses was avoided during the operation.

RESULTS.

Diagrams of a characteristic case are shown in Fig. 3. For six frequencies (125, 250, 500, 1,000, 2,000 and 4,000 cps.) pre- and postoperative potentials were taken for various intensities. The ordinate indicates voltage in arbitrary units (the same for all frequencies), the abscissa, sound intensity in db. above 10^{-16} watt/cm.^{2}, as determined by means of a sound level meter.

From Fig. 3, it is apparent that an increase in cochlear response is found throughout the frequency range tested, the improvement being least distinct for 125 cps. It was at just

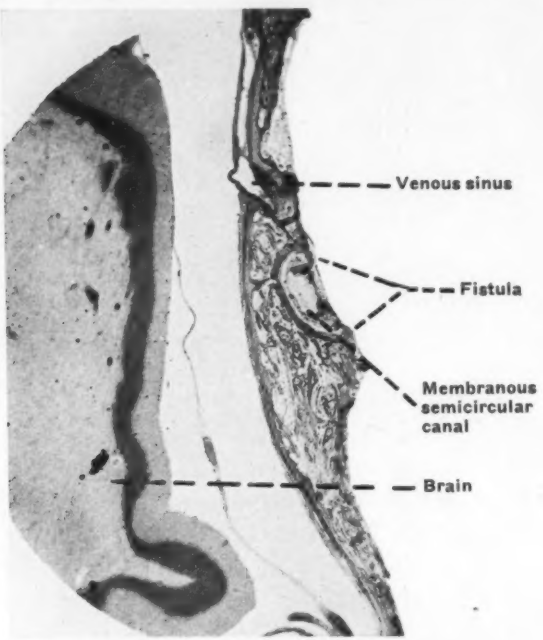


Fig. 2.

this frequency that some difficulties were encountered in recording the postoperative potential (see later), so that certain irregularities may be due to artifacts. The curves do not permit a direct comparison with human tests since they indicate cochlear output versus sound intensity, whereas the common audiogram gives the increase in sound intensity necessary to raise it from normal to pathological threshold. In the electric animal experiment, the notion of threshold loses its importance and meaning since the minimal voltage output depends on several nonbiological conditions; *e.g.*, electric resistance of the preparation, noise level, sensitivity of the amplifier, etc. On the other hand, the animal audiogram

furnishes information about the response to sound intensities above threshold whose measurement in humans requires the use of Fowler's balance test.[3]

An estimate of functional improvement for any one intensity may be gained from Fig. 3 by measuring the horizontal

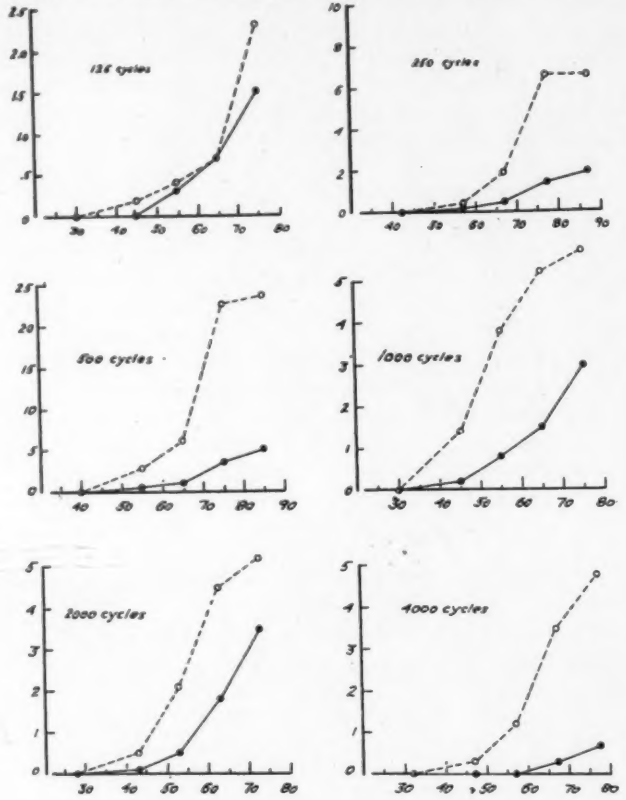


Fig. 3.

distance between corresponding points of the solid and dotted lines. Near threshold, this is seen to be about 10 to 25 db. for the frequencies tested. It is apparent that the gain is

generally greater for higher sound intensities. This possibly indicates that in man, threshold audiograms alone are not sufficient for complete evaluation of the operative success. Since in ordinary conversation the patient has to react to sound intensities well above threshold, practical hearing gain may be actually higher than that expressed by the threshold audiogram. The suggestion may be submitted to otologists to supplement their pre- and postoperative examinations by the balance test. In the particular problem of the fenestration operation, the test may be useful even when preoperative hearing is approximately equal in both ears.

Two additional observations, made during these experiments, may deserve mention. As indicated above, it has been found that accidental injuries to the sinuses accompanying the semicircular canals (see Figs. 1 and 2) lead to an irreversible drop in cochlear potential. This persists after the initial bleeding has been stopped. Such preparations cannot be used in the experiment. It seems puzzling that obliteration of a *vein* should lead to an appreciable change in cochlear microphonics. While the cause of the phenomenon is not known, it might be mentioned that these sinuses are apparently in direct communication with vessels in the pigeon's lagena (cochlea). Thus, stagnation of the blood flow might interfere with the auditory function.

The second observation is related to the fact, mentioned above, that at 125 cps. there were difficulties in obtaining consistent postoperative potentials. Actually, there are almost in every case, superimposed on the cochlear response and the usual noise level, regular periodic fluctuations of the potential which do not permit the meter needle to become settled in any definite position. The rhythmic character of the potential led to the assumption that one might be dealing with some vestibular response. At first it was thought that the potential was generated in the vestibular end-organ, but later it was found to be due to contractions of the neck muscles, an effect which had been obscured by the complete immobility of the head in the holder. Otherwise, head nystagmus would probably have been observed. This phenomenon was present even in animals whose muscles appeared completely relaxed. Injection of novocaine into the muscles

of the neck abolishes the fluctuations. Vestibular effects of strong sounds upon animals with perforated semicircular canals have been described by Tullio.[4]

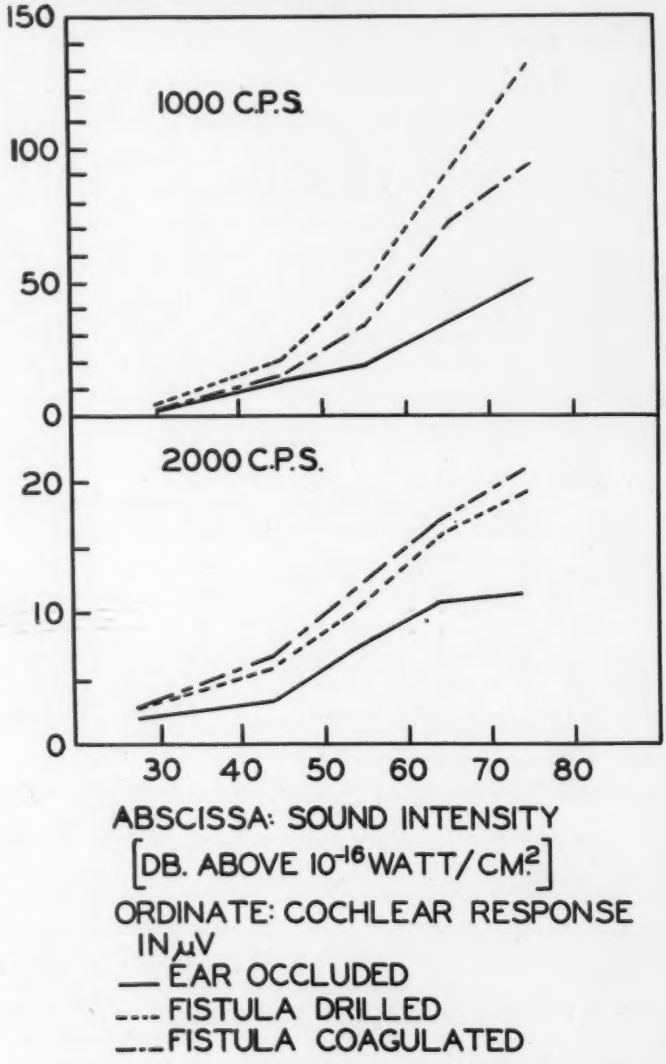


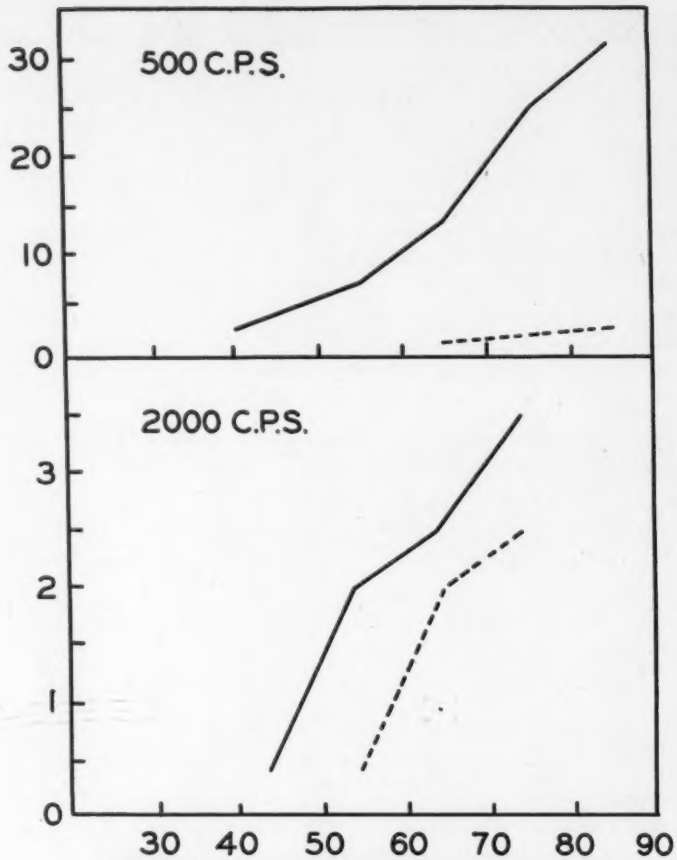
Fig. 4.

Results reported up to this point were obtained from the first series of experiments. The electric method lends itself to the investigations of other problems concerning the effect of fenestration, a few of which have been studied and will be briefly described.

Inasmuch as the membranous canal may be accidentally damaged during fenestration, an attempt was made to determine the functional effects of such injury. It is clear that again only immediate results could be investigated. On four animals, pre- and postoperative potentials were recorded; this was followed by insertion of a glowing metal needle into the fistula in the anterior semicircular canal so that a distinct sizzling sound could be heard. The heat presumably led to the immediate coagulation of tissue fluid around the fistula. Thereafter, another series of potentials was taken. Fig. 4 shows a characteristic result for two frequencies (1,000 and 2,000 cps.). Coagulation causes only a slight reduction of initial gain for 1,000 cps. For 2,000 cycles, there is practically no change (the slight additional gain does not exceed 4 db. for any one intensity). It would seem, therefore, that a slight injury to the membranous canal need not preclude a satisfactory result, provided no secondary changes take place.

If, however, an appreciable part of the membranous canal is removed, the postoperative result is a definite loss in response. A characteristic diagram showing the results on one animal out of three is seen in Fig. 5. The reduction in original hearing is very considerable, particularly for 500 cps.

Pre- and postoperative response to bone-conducted sound was tested on four animals. Technique and apparatus used have been described elsewhere.[5] In these experiments, the bone conductor was connected with the exposed bone in the parietal region. Although the results were not uniform, the example given in Fig. 6 is fairly representative. The postoperative change in response to air- and bone-conducted sound at three frequencies is shown for the same animal. Whereas there is distinct gain for air conduction, there is practically none for bone conduction — possibly a slight loss for some higher intensities. Near threshold no change was found in any animal, at least for middle and higher frequen-


500 C.P.S.
30
20
10
0
2000 C.P.S.
3
2
1
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30 40 50 60 70 80 90
ABSCISSA: INTENSITY OF SOUND [DB. ABOVE 10^{-16} WATT/CM^2]
ORDINATE: COCHLEAR RESPONSE IN μV
— EAR OCCLUDED
---- MEMBRANOUS CANAL PARTLY REMOVED

Fig. 5.

cies. Determinations for lower frequencies were not quite uniform due to fluctuations in potential. These results are in agreement with clinical reports[6] that there is no appreciable change in bone conduction after fenestration operation. Here again, human audiograms are based on threshold measurements.

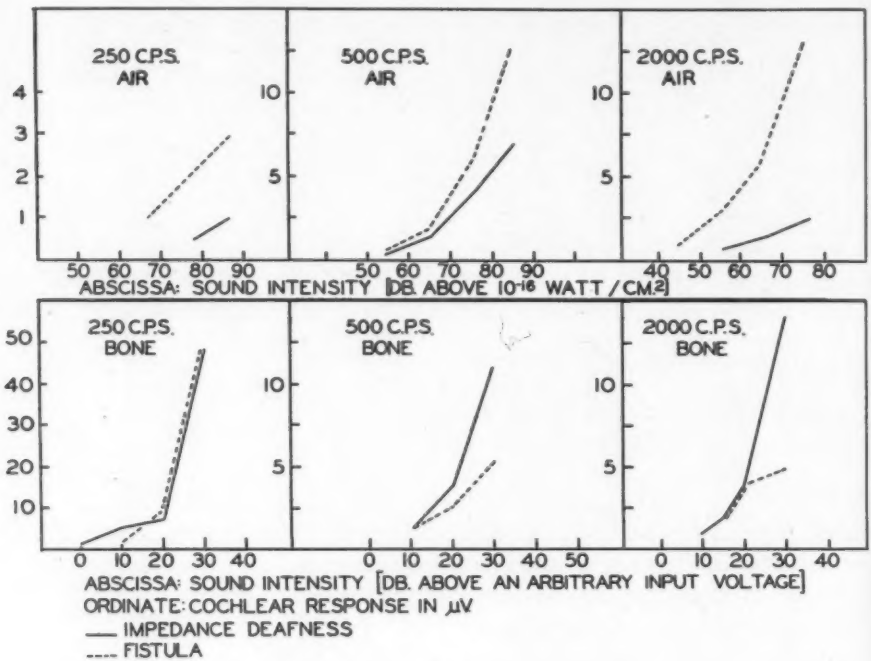

Fig. 6.

A discussion of the possible mechanisms underlying the effect of fenestration will be delayed until the results of behavioral studies have been reported. However, one problem might be treated here together with the corresponding experiment. Whereas it is clear that decompression due to escape of perilymph cannot be of importance for the *late* result of fenestration, it is at least logically possible that drainage of fluid be of some influence for the *immediate* effect.[7] To put it in a more physical form: the fistula, as created by most of the accepted methods, leads chiefly to two

immediate results: *1.* opening of the inner ear, resulting in decrease of stiffness; *2.* loss of fluid, leading to reduction in mass. As mentioned above, the experiment in pigeons did not permit separation of the two effects since fistulization was always attended by loss of perilymph. In lack of any other approach, the following somewhat indirect experimen-

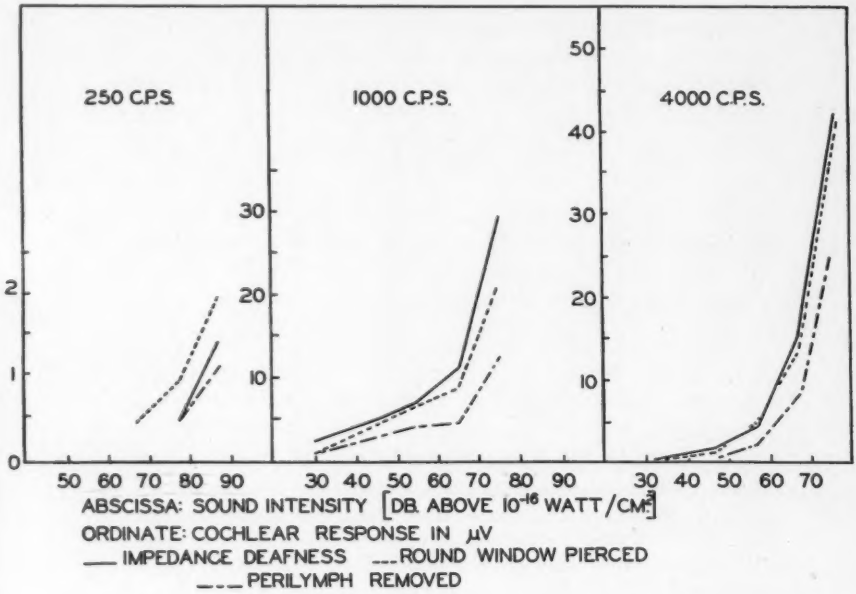

Fig. 7.

tal method was chosen. In the cat, the middle ear was filled with mineral oil as completely as possible. This can be done without injuring the drum membrane and leads to considerable immobilization of the ossicles. Cochlear potentials were recorded from the promontorium. After piercing the round window membrane, but without permitting any loss of perilymph, another set of readings was taken. Finally, perilymph was removed from the round window by capillary action of a dental pledget, followed by another determination of cochlear potentials. Throughout the procedure, the recording electrode remained *in situ* and was protected from moisture,

since the perilymph was confined to the niche of the round window. Of three animals tested, a representative case is shown in Fig. 7. For three frequencies, removal of perilymph leads to reduction in cochlear response rather than gain. It can accordingly be stated that, in conduction deafness of the type used in this experiment, loss of perilymph does not increase, but rather reduces cochlear response.* Inasmuch as immobilization of the ossicles is also characteristic for otosclerotic deafness, one would conclude that loss of perilymph is not an important factor in the immediate hearing gain due to fenestration.

SUMMARY.

1. In pigeons, otosclerotic deafness was imitated by immobilizing the columella. The cochlear potential, as an indicator of intracochlear vibration, was recorded before and after fenestration of the anterior semicircular canal.

2. For practically all frequencies and intensities tested, fenestration leads to an increase in cochlear microphonics, the gain being greater for higher intensities. This latter observation may be of clinical importance since the patient predominantly uses intensities well above threshold. It might, accordingly, be of interest to include the balance test in the routine examination of the candidate for operation.

3. Cauterization of the fistula reduces the gain only slightly.

4. Removal of part of the membranous canal leads to considerable reduction in cochlear response.

5. The response to bone-conducted sound is not improved by fenestration. For higher intensities, there may be some decrease.

6. Removal of perilymph does not improve the electric response in artificial conduction-deafness. It is consequently believed that escape of inner ear fluid is not responsible for the immediate hearing gain after fenestration.

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*That hearing in the **normal** ear is reduced by loss of intracochlear fluid has been shown by Kobrak.[9]

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CASSELBERRY AWARD OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION

A sum of money having accrued from the Casselberry Fund of the American Laryngological Association, a prize will be offered in 1945 for original investigation in the art and science of laryngology or rhinology. Theses must be in the hands of the Secretary, Dr. Arthur W. Proetz, 1010 Beaumont Building, St. Louis 8, Mo., before March 1, 1945.

THE USE OF PENICILLIN IN OTORHINOLOGIC INFECTIONS. REPORT OF FIVE CASES WITH RECOVERY.

SAMUEL D. GREENFIELD, M.D.; ISADORE KURITZKY, M.D.; and EZRA A. JACOBS, M.D.,
Brooklyn, N. Y.

This paper has been inspired as a result of our recent experience in the use of penicillin in a number of otorhinologic infections which heretofore have called for surgical intervention. Not only has its employment made it unnecessary to subject patients to operation where formerly operation was imperative, but in several instances it has rendered some very serious and even hopeless infections amenable to treatment with resultant recovery.

Here again is a striking example wherein the field of otorhinologic surgery is ever being narrowed as a result of the discovery of new nonsurgical therapeutic measures. The sulfa drugs have slowly but surely reduced the incidence of mastoid suppurations, acting as a prophylactic rather than a curative agent. Penicillin therapy may now be used where sulfa therapy has been only partially effective or has failed.

We are reporting five interesting cases which demonstrate conclusively the efficacy of penicillin therapy:

Case 1: Cavernous Sinus Thrombosis, Penicillin and Heparin Therapy with Recovery.

Case 2: Osteomyelitis of the Skull, Epidural Abscess, Operation, Penicillin Therapy with Recovery.

Case 3: Acute Surgical Mastoiditis, Penicillin Therapy, Recovery Without Operation.

Case 4: Recurrent Mastoiditis, Penicillin Therapy, Recovery Without Operation.

Editor's Note: This ms. received in Laryngoscope Office and accepted for publication, Dec. 21, 1944.

Case 5: Subperiosteal Abscess in an Infant, Penicillin Therapy, Recovery Without Operation.

Case 1: Cavernous Sinus Thrombosis, Penicillin and Heparin Therapy, with Recovery.

J. C., aged 42, was admitted to the hospital on Jan. 21, 1944, with high temperature and swelling of the left side of the face and eyelids.

Previous Personal History: The patient had an old chronic nasal sinus infection. For many years he had been subject to frequent head colds and was a constant nose-blower. A submucous resection was performed seven years ago, and a bilateral maxillary antrotomy was done three years later. He was a confirmed nose-picker.

History of Present Illness: Three days prior to admission to the hospital the patient noted an area of soreness in the left nasal vestibule. He picked it; next day the entire alar was red and swollen. That evening he had a chill, followed by a rise in temperature to 104 6°. The following morning the family physician made a diagnosis of erysipelas and put him on massive doses of sulfadiazine. That night he had another chill and a rise in temperature to 105.4°. He was admitted to the hospital in the morning and examination disclosed a very sick patient with a temperature of 105.2°, pulse 126 and respiration 31. The entire left side of the face was reddened and swollen. Both eyelids were very edematous, and the conjunctiva was chemotic. The eyeball itself was proptosed and fairly well fixed. A large furuncle was present in the left nasal vestibule. The red count was 3,500,000; the white count showed 28,000 cells with 92 per cent polys.

Ophthalmological Examination, Jan. 24, 1944: The supraorbital veins were dilated and tender, with redness along their course. There was no light perception in the left eye and the pupil did not react to light. The globe was proptosed and fixed. Chemosis of the conjunctiva was very marked. The retina was edematous, especially in the region of the nerve head. All the vessels were very much distended. Diagnosis: Cavernous sinus thrombosis (left).

X-ray examination of the nasal accessory sinuses showed no demon strable areas of osteoclasia. There was a chronic left antritis.

Blood cultures taken on Jan. 23 and 25 were subsequently reported positive for the streptococcus hemolyticus. A similar organism was found in pure culture in the abscess situated in the vestibule of the nose.

Treatment: On Jan. 25, penicillin and heparin therapy was started and carried out as follows:

Jan. 25: Penicillin, 100,000 units; heparin, 100 mg.
Jan. 26: Penicillin, 100,000 units; heparin, 200 mg.
Jan. 27: Penicillin, 50,000 units; heparin, 100 mg.
Jan. 28: Penicillin, 100,000 units; heparin, 200 mg.
Jan. 29: Penicillin, 100,000 units; heparin, 100 mg.
Jan. 30: Penicillin, 50,000 units; heparin, 200 mg.

Blood culture on Jan. 28 was reported sterile. The temperature reached normal on Jan. 31 and remained so until day of discharge, Feb. 26, 1944. This patient completely recovered from his original infection but lost the vision in the affected eye.

Conclusion: From the history, physical findings and clinical course, there leaves little room for doubt that we were dealing here with a case of cavernous sinus thrombosis. The original site of infection was apparently the furuncle in the left nasal vestibule. We know that infections in this area are oftentimes serious because of the intimate and rich circulatory interchange that exists between the superficial vessels located here and the deeper veins leading to the cavernous sinus. It seems logical to believe that this infection followed such a course.

Cavernous sinus thrombosis until recently has invariably been a fatal complication; however, with penicillin and heparin therapy the outlook for such a serious complication is much brighter.

*Case 2: Osteomyelitis of the Skull, Epidural Abscess, Operation, Penicillin Therapy, Recovery.**

Miss A. S., aged 16 years, was admitted to the hospital on Jan. 19, 1944, complaining of swelling of the upper and lower left eyelids, moderate conjunctival chemosis, partial fixation of the left eyeball, severe headache and a temperature of 103.2°.

Previous Personal History: Irrelevant.

History of Present Illness: Seventeen days prior to admission to the hospital, the patient suffered a grippe infection which was especially notable because of the associated severe headache. She was treated by her family physician with the usual antipyretics and sedatives in conjunction with large doses of sulfathiazole. At the end of the first week, all the symptoms had subsided with the exception of the headache which was limited to the left forehead and eye. This continued and 10 days prior to admission to the hospital the upper eyelid became puffy and she had a temperature of 101°. This condition grew progressively worse — the temperature ranged from 100° to 103½° — the headache became intensified, the edema of the lids increased until on the tenth day she presented the clinical picture described upon admission. Unfortunately, her family physician did not recognize the seriousness of the patient's illness and treated her with argyrol drops, boric acid compresses and sulfathiazole. In all, she received approximately 400 gr. of the drug.

X-ray studies in the hospital revealed a frontoethmoidal cloudiness on the left side. The diagnosis was very important; i.e, an acute frontal sinusitis with possible rupture into the orbit.

Blood count showed 4,750,000 red cells, 13,000 white cells and a differential of 68 per cent polynuclears. The urine disclosed a faint trace of albumen.

External frontal sinus operation, Jan. 19, 1944.

General anesthesia was used, and the usual eyebrow incision was made through the skin and the soft parts. The periosteum was cut through at

*Presented before the Otolaryngological Section of the Kings County Medical Society, May, 1944.

a lower level; the floor of the frontal sinus was exposed and the eyeball retracted. There was no free pus in the orbit and there was no evidence of a break in the bone; however, upon entering the frontal sinus, the latter was found to contain free pus and a markedly diseased lining. A large part of the floor was taken away, including considerable lamina, the latter being softened and necrotic. The anterior wall of the sinus was also removed, leaving a good-sized bridge for cosmetic reasons. The inner table was carefully examined, but there was no macroscopical evidence of its involvement. A good-sized rubber tube led from the operated area into the nasal cavity, thus establishing adequate drainage. The original incision was tightly closed.

Postoperative course seemed uneventful.

On the fourth day the temperature was normal, the edema of the eyelids was rapidly receding, and all headache had disappeared. On the fifth day the sutures were removed and the wound healed by primary union.

Now, despite the fact that clinically there were no complaints, and the eyeball moved freely, some edema of the upper eyelid persisted. There was some sensitiveness to pressure over the bridge that was left at the time of operation. On the tenth day it was decided to withdraw the drainage tube, for we felt that possibly its presence was responsible for the persistent edema; however, its removal produced no change. During this entire convalescent period the patient received no medication of any kind.

On the fourteenth postoperative day, the patient did not feel like getting out of bed. She was tired and languid. Upon examination we found that the edema of the upper eyelid had increased slightly, and the patient complained of headache for the first time. Her temperature reached 100½° that afternoon. The next day the headache was more intense, the patient had no appetite, and upon examination we found an area of tenderness midway between the upper limit of the frontal sinus and the hair line. Not only was this area tender but there seemed to be some edema at this site. The maximum temperature that day reached 101°. With the spreading edema, headache and temperature, we suspected an extension from the frontal sinus into the diploe of the frontal bone and a diagnosis of osteomyelitis was made. X-rays taken that day disclosed an area of rarefaction coinciding with the area of the frontal bone that was tender and edematous.

In view of the fact that the patient was not too uncomfortable, the temperature was of a low grade nature, and her general condition was good, we deemed it advisable to wait, hoping for localization of the process.

She was permitted to go on for another 72 hours, making it the eighteenth day postoperatively when it was noted that the headache grew more intense and she vomited several times during the forenoon. More significant was the fact that on several occasions the pulse rate had reached 60 and at one time went as low as 40. There was no nuchal rigidity, no fundus changes and no other neurological signs; however, it was decided to operate that afternoon. A spinal tap showed no increase in pressure, and owing to blood contamination no additional information was available.

Operation, Feb. 7, 1944.

An incision was made through the previous eyebrow scar extending from the outer canthus to the midglabella line. Another incision, beginning at the latter point and at right angles to the former was carried up to the hair line. The soft parts and periosteum were reflected and the entire frontal bone laid bare. The area which showed rarefaction of the bone at X-ray was reddish, discolored and appeared mouse-nibbled. Upon

removing this diseased bone a large epidural abscess was uncovered. The bone was taken away above and laterally well beyond the diseased area and mesially across the midline to the other side. The other frontal sinus was opened, and the inner tables of both frontal sinuses were removed. The dura was inflamed and thickened and at one site there was an area of discolored, necrotic granulation tissue about the size of a 50-cent piece. In view of the slow pulse and the markedly diseased dura, a trochar was introduced into the frontal lobe in an effort to disclose a collection of pus, but none was found.

The skin flap was replaced in position and the incision closed, with rubber tissue dam introduced for drainage purposes. Likewise, intranasal drainage was established by means of a rubber tube leading from the operated area into the nasal fossa.

Immediately following the operation, penicillin therapy was instituted. The patient received 15,000 units intramuscularly every four hours throughout the day and night for one week, 10,000 units every four hours during the day for one week, and 3,000 units three times daily for another week.

This made a total of about 1,000,000 units of penicillin.

She likewise was given two transfusions of 250 cc. each on the second and fourth postoperative days. Aside from this, she received no other medication excepting an occasional sedative.

The postoperative course was very satisfactory. Within 48 hours the temperature reached normal and all headache and discomfort about the eye abated. By the end of the week the swelling of the lids subsided and the eyeball was normal. The patient was out of bed in 10 days and left the hospital on March 6, 1944, about four weeks after operation.

Aside from the disfigurement occasioned by the extensive bone removal, the patient when last seen was in perfect health.

There are two points of interest in connection with this case that we wish to emphasize:

1. It demonstrates the already well established observation that although sulfa drugs are of great value, they are not a panacea for all infections. Despite the fact that this patient received sulfathiazole almost at the beginning of her grippe infection and in large quantity (400 gr.), yet she developed a serious bone and brain complication.

2. This patient was seriously ill — she had an extensive epidural abscess with definite pathology in the dura, and a well established spreading acute osteomyelitis of the frontal bone. We can well speculate what we might have expected in this patient 10 years ago when the treatment of osteomyelitis varied with each operator.

It is certainly most striking, therefore, to witness such rapid cessation of all the symptoms with the institution of the

penicillin therapy. The surgical intervention was a contributing factor, but there is no doubt that the penicillin halted the spread of the osteomyelitis and hastened recovery.

Case 3: Acute Surgical Mastoiditis, Penicillin Therapy, Recovery Without Operation.

M. G., aged 9 years, was admitted to the hospital, May 6, 1944, complaining of aural discharge, mastoid tenderness, headache and pyrexia.

Previous Personal History: Irrelevant.

History of Present Illness:

Five weeks prior to admission to the hospital, the patient suffered a grippe infection. Several days later the right middle ear became involved, and an otologist incised the drum membrane. The ear discharged for a period of three weeks with occasional headaches and intermittent low grade temperatures. In the fourth week the attending otologist X-rayed the mastoid and advised operation; however, the parents of the patient were opposed to any surgical intervention, and they engaged the services of another otologist. He treated the patient for about one week and prescribed large doses of sulfathiazole. During this week the patient complained of headache and began to run an evening temperature as high as 102°. This second otologist also advised operation and cautioned against further delay. Again the parents refused to follow the advice of the second otologist, and then sought our opinion and advice.

The patient was examined by us on May 6, 1944, and the following findings were noted:

The aural discharge was thick and pulsating; the posterosuperior canal wall was drooping; tenderness was present over the entire mastoid region and hearing was decreased, to failure to hear whispered voice ad concham. The patient had a five-week history; had spontaneous headache and temperature of 101.4°.

X-ray pictures brought with the patient and taken one week previously showed definite bone involvement. If ever there was indication to operate upon a mastoid, this certainly was one.

We advised immediate operation, but the parents would not consent. Two days prior to our examination the pus in the canal had been cultured by a laboratory and the report showed a streptococcus hemolyticus. The parents were well informed, knew about penicillin and were very anxious to try a course of treatment. They were willing to assume the responsibility for any complication that this delay in operating might entail. We were also pleased to be given the opportunity of observing the effect of penicillin in such a case.

The patient was admitted to the hospital and penicillin therapy immediately started.

Treatment:

May 6: 120,000 units penicillin given 15,000 every three hours.
May 7: 80,000 units penicillin given 10,000 every three hours.
May 8-9: 60,000 units penicillin given 10,000 every four hours.
May 10-11: 40,000 units penicillin given 10,000 every six hours.
May 12-13-14: 30,000 units penicillin given 10,000 three times daily.

Result of Therapy: After the first 72 hours, the discharge diminished considerably and the temperature reached normal. Headaches had disappeared completely.

After the second 72 hours the discharge ceased and the tenderness over the mastoid was gone.

After the third 72 hours all the landmarks in the drum had reappeared. Hearing had returned so that whispered voice could be heard six feet away.

The patient left the hospital on the twelfth day with a completely resolved middle ear. He was seen again three weeks later and found to be in perfect health.

Case 4: Recurrent Mastoiditis, Penicillin Therapy, Recovery Without Operation.

Miss C. O., 28 years old, was admitted to the hospital, Sept. 12, 1944, complaining of aural discharge, headache and temperature.

Previous Personal History: The patient had a simple mastoidectomy at the age of five. She recovered with a dry middle ear. She suffered frequent head colds and on a number of occasions had pain in the ear without suppuration.

History of Present Illness: Five weeks prior to admission to the hospital the patient suffered a severe head cold. Two days later the old operated ear became involved and the drum ruptured spontaneously. During the ensuing three weeks the middle ear discharged and the patient seemed fairly comfortable. At no time during this period was there any pyrexia or headache. In the fourth week of her illness she complained of pain in the mastoid region and suffered nocturnal headaches. In the fifth week tenderness appeared over the mastoid process and a rise in temperature was noted in the evening. Several days before we saw her the mastoid scar became reddened and elevated, and the headache became more intense. At no time during her entire illness did her family physician resort to chemotherapy.

Examination of the patient at the time of admission to the hospital disclosed an aural discharge that was copious, thick and pulsating. The posterosuperior canal wall was down. Exquisite mastoid tenderness was elicited over the mastoid process, and the mastoid scar was reddened, edematous and elevated. Hearing was down to the extent that a whisper could not be heard ad concham. The temperature was 101.2°.

Blood count revealed 4,500,000 red cells, 27,000 white cells with a poly count of 80 per cent. The urine was normal and the general physical examination was essentially negative.

X-ray of the mastoid process showed a large number of regenerated cells in the mastoid tip and over the sinus and dural plates. These were definitely involved.

From both the history and the clinical picture there is no question that this case was a surgical mastoid. In view of the fact that this patient had at no time during her illness received the benefit of any chemotherapy, we advised a course of penicillin therapy before resorting to operation. The patient willingly consented to this plan of treatment.

She received 15,000 units of penicillin intramuscularly every three hours for two days; 10,000 units every three hours for two days; 10,000 units every four hours for four days; 10,000 units every six hours for two days. The patient received no other medication while in the hospital.

At the end of 72 hours all pain had subsided; the discharge became scanty, and the redness of the postauricular scar disappeared. After the second 72 hours the middle ear was dry, and the drum showed definite evidence of resolution. The hearing had improved so that the patient could hear a whisper six feet away. After the third 72 hours all the landmarks of the drum had reappeared; the pain and tenderness over the mastoid were gone, and the hearing had further improved. The

patient left the hospital on the tenth day. She was re-examined one month later and found to be in perfect health.

Conclusion: This case was the typical so-called recurrent mastoiditis. Formerly, these cases were always treated surgically. In some instances an incision was made through the old scar and a drain introduced into the antrum. On the other hand, many otologists would resort to a complete revision of the mastoid in an effort to remove all the reformed mastoid cells. With the use of penicillin therapy this patient was spared the necessity of surgical intervention.

Case 5: Subperiosteal Abscess in an Infant, Penicillin Therapy, Recovery Without Operation.

C. S., aged 3½ months, was admitted to the hospital, Nov. 8, 1944.

Previous Personal History: This infant seemed to be born with a head cold. Immediately after being brought home from the hospital the child had a nasal discharge and there was difficulty in breathing.

History of Present Illness: Three weeks prior to admission to the hospital the patient began to run a low grade temperature and was restless at night. The family physician had difficulty in visualizing the drum membranes. This continued for about two weeks when the child's temperature suddenly rose to 103° and she became very irritable. The next morning a swelling appeared behind the left auricle. This increased in size and within 24 hours it involved the entire mastoid area and zygoma above and in front of the auricle.

At the time of admission the patient's temperature was 101.4°. The drum membrane was edematous and full. There was edema over the mastoid and especially over the zygoma. This entire area was exquisitely tender.

This picture was typically that of a subperiosteal abscess seen so often in young infants. The middle ear episode is usually overlooked and the patient goes on until a subperiosteal collection produces the significant swelling and edema. Ordinarily this child would have been subjected to operation; however, in the light of our recent experience, we decided upon a course of penicillin therapy with paracentesis of the drum membrane.

Treatment: The drum was incised immediately upon admission to the hospital and the ear canal kept clean with frequent dry wiping.

Penicillin was given as follows:

Nov. 8-9: 30,000 units given 5,000 units every four hours.
Nov. 10-11: 20,000 units given 5,000 units every six hours.
Nov. 12-13-14: 15,000 units given 5,000 units three times daily.

After the first 72 hours all the edema and tenderness over the mastoid and zygoma had disappeared, and the aural discharge was scanty. The temperature became normal on the second day in the hospital.

After the second 72 hours, the middle ear was dry, and the drum showed signs of resolution.

The child left the hospital completely well, eight days after admission. She was seen two weeks later and was fully recovered.

169 New York Avenue.
1480 Nostrand Avenue.
Boston, Mass.

LOWERING THE GLABELLA IN RHINOPLASTY.

M. WILLIAM MOOTNICK, M.D.,
New York, N. Y.

The present accepted method of lowering the glabella by the use of a specially made rasp has proven very unsatisfactory in my experience, but I managed to overcome this difficulty by a new original technique.

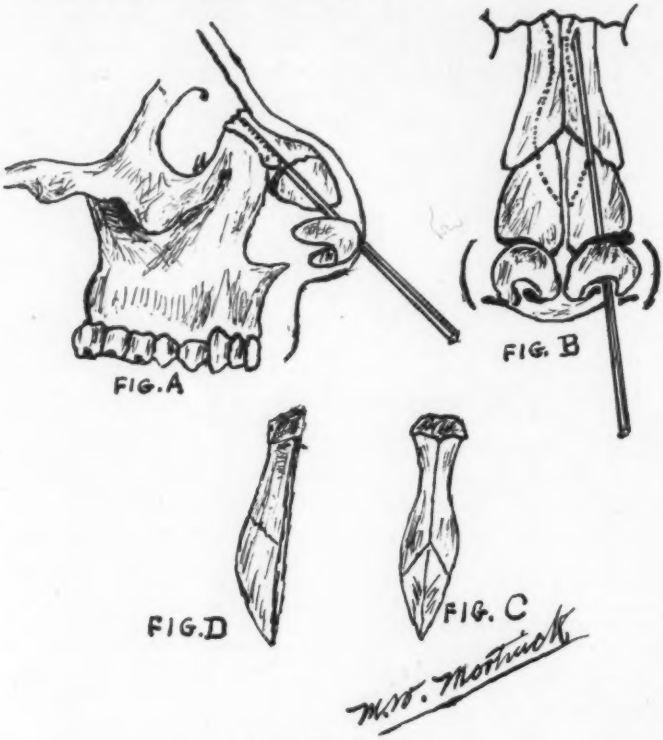

Fig. 1.

During the process of removing a nasal hump with the use of a bayonet saw, the latter is placed on a level with the

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normally depressed glabella, the sawing is continued in a straight line with the new cosmetic profile, at about a 30° angle; but where you find that the dorsum of the nose is on the same level with the frontal bone or forehead and with no glabella depression in between, the final result of the hump nose operation will prove disappointing, the forehead line being continuous with the line of the new profile.

My suggestion is, that during the process of sawing off a nasal hump, the bayonet saw should be placed below the glabella, a few mm. more or less as the case indicates, as in Fig. A, and the sawing of the nasal hump should be continued until severed. You will find that the upper end of the nasal bony hump is still attached to the frontal sagittal suture, and, using a 10 mm. chisel, placed on the flat surface underneath the hump, the severance of the bony hump is continued with the chisel until you meet the frontonasal articulation. The chiseling is then continued on either side of the upper end of the nasal bone, with a 7 mm. chisel placed at an angle, directed inward, upward and backward until you reach the frontonasal articulation, as in Fig. B.

By manipulating the nasal bony hump slightly upwards and from side to side, it may be dislodged and freed from its attachment with the frontal bones. The nasal hump when removed will include part of the glabella, as shown in the anterior position in Fig. C; side view in Fig. D.

11 West 42nd Street.

NEW INSTRUMENTS — AN EFFECTIVE ASPIRATING TIP AND STYLET FOR SURGICAL USE.

J. JEROME LITTELL, M.D.,

Indianapolis, Ind.

The instruments pictured here recommend themselves for their simplicity, availability and inexpensiveness. The upper of the two is a jeweler's sawed-off brass blow pipe. It does not stop up readily because of its conical shape. It can be truncated at whichever point the operator desires.

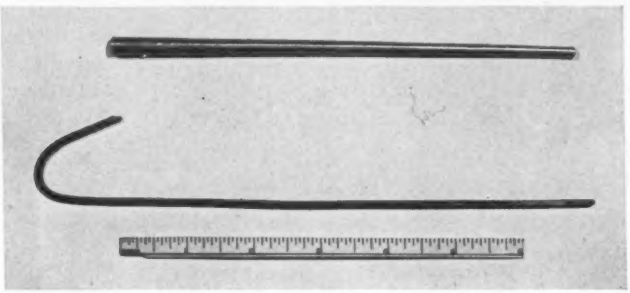

Fig. 1.

The lower of the instruments illustrated is a sawed-off piece of wire coat hanger. It is especially well liked, not only by the writer but also by his confreres, as it may be used in any aspirating tip of a caliber suitable for it.

The former may be obtained from William Dixon Co., Newark, N. J., for less than 50 cents, and the "ramrod" from any coat closet.

Both of these readily available articles serve the writer's purpose better than more formal instruments made for this purpose.

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603 Hume Mansur Building.

ANNOUNCEMENT OF THE SPRING REFRESHER COURSE IN OTOLARYNGOLOGY BY THE UNIVERSITY OF ILLINOIS, COLLEGE OF MEDICINE.

The fifth semiannual refresher course in laryngology, rhinology and otology will be conducted by the University of Illinois, College of Medicine at the College in Chicago, March 26 to 31 inclusive, 1945. While the course will be largely didactic, some clinical instruction will be included. This course is intended primarily for ear, nose and throat specialists. As the registration is limited to 30, applications will be considered in the order in which they are received. The fee is $50.00. When writing for application, please give details concerning school, year of graduation, and past training and experience. Address: Dr. A. R. Hollender, Chairman, Refresher Course Committee, Department of Otolaryngology, University of Illinois, College of Medicine, 1853 West Polk Street, Chicago 12, Ill.

THE AMERICAL LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, INC.

The Annual Meeting of the Triological Society will be held at The Drake in Chicago on Monday and Tuesday, May 28 and 29, 1945. Annual meetings of the American Laryngological Association, the American Broncho-Esophagological Association and the American Otological Society, Inc., will continue for the remainder of the week.

Due to the exceptionally heavy demand for guest rooms, it is necessary to make reservations as far in advance as possible. Please advise the hotel the time and date of departure.

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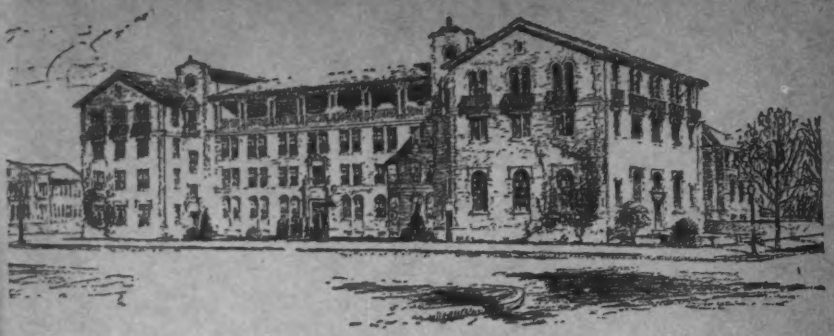

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